

CLAIMS:

What is claimed is:

1. A device comprised of a flexible tubular element 1 to which is attached, connected or incorporated one or more springy elements, and

the springy element(s) are made of metal, plastic, superlastic nickel-titanium, other springy material, or Shape Memory Allow (SMA) or other material that exhibits shape recovery, or compositions thereof, and

said springy element(s) are loaded or further loaded, if preloaded, by being rolled-up with the tubular element to which they are attached, connected or incorporated, from the proximal end of the tubular element, in the direction of the distal end, to form an approximate torus shape, and in the case of Shape Memory Allow (SMA) or other material that exhibits shape recovery, the springy element(s) are rolled-up in their martensitic phase, or in the case of other materials that exhibit shape recovery, an analogous phase, and

restraining means, which may be composed of detachable attachments on the adjoining surfaces or extensions of the adjoining surfaces of the rolled tubular element, preferably near the distal outside end of the tubular element, which when attached, restrain the loaded rolled-up tubular element from unloading and unrolling, prior to being detached, and

a body part may be inserted into or immediately adjacent to the inside distal end of the tubular element, while the tubular element is so restrained, and

when the restraining means are released such as when the detachable attachments are detached, the loaded and rolled-up springy elements unload and spring-back, causing the rolled-up flexible tubular element 1 to unroll, or in the case of the springy element being composed of Shape Memory Alloys (SMA) or other materials that exhibit shape

recovery, before or after the detachable attachments are detached, the rolled-up part 4 of the tubular element 1, is heated from the loaded martensitic state to its unloaded austenitic state, or in the case of other materials that exhibit shape recovery an analogous change of state, causing shape recovery of the springy element to spring-back, causing the rolled-up flexible tubular element 1 to unroll, and

the tubular element unrolls over the inserted body part, covering the said body part.

2. A device comprised of a flexible tubular element to which is attached, connected or incorporated one or more springy elements, and

the springy element(s) are made of metal, plastic, superlastic nickel-titanium, other springy material, or compositions thereof, and

additional springy elements are attached, connected or incorporated into the said tubular element 1 that are made of Shape Memory Alloy (SMA) or other material that exhibits shape recovery, and

when the additional springy elements are at ambient temperature, they are in the martensitic state and are floppy, or analogous state, for other materials that exhibit shape recovery, and

original springy element(s) are loaded or further loaded, if preloaded, by being rolled-up with the tubular element to which they are attached, connected or incorporated, from the proximal end of the tubular element 1, in the direction of the distal end, to form an approximate torus shape, and

restraining means which may be composed of detachable attachments on the adjoining or extensions of the adjoining surfaces of the rolled tubular element 1, preferably near

the distal outside end of the tubular element, which when attached restrain the loaded rolled-up tubular element from unloading and unrolling, prior to being detached, and

a body part may be inserted into or be placed immediately adjacent to the inside distal end of the tubular element while the tubular element 1 is so restrained, and

when the restraining means are released such as when detachable attachments are detached, the loaded and rolled-up original springy elements unload and spring-back, and overcome any resistance that the additional springy elements, which are floppy at ambient temperature, might put up, causing the rolled-up flexible tubular element to unroll, and

the tubular element unrolls over the inserted or immediately adjacent body part, covering the said body part, and

after the tubular element is unrolled by the unloading and spring-back of the original springy elements, and at such time that the wearer wishes to remove the said tubular element 1 from the body part it covers, the wearer can apply sufficient heat to the additional springy elements, sufficient to effect shape recovery of a rolled-up shape, such that the recovery of such shape is sufficiently energetic that it overcomes the opposing force of the original springy element(s) causing the said tubular element to roll-up and off the inserted body part, thus removing the covering tubular element, and

perhaps after the said restraining means, such as detachable attachments are attached to restrain the tubular element from unrolling, the application of heat can be terminated, which causes the additional springy elements to relax to their martensitic state or analogous state, for other materials that exhibit shape recovery, and

the original springy elements can again prevail over the additional springy elements and cause the tubular element to unroll as soon as the said restraining means are released,

such as when the detachable attachments restraining the coiled tubular element are detached.

3. A method of covering a body part with a covering that includes a tubular element 1, or is composed of a tubular element 1, and

the tubular element 1 is rolled-up, thereby loading a springy element attached, connected or incorporated to the said tubular element 1, and

once rolled-up or partly rolled-up, restraining means such as a detachably attaching restraining element(s) is detachably attached to prevent the loaded rolled-up or partly rolled-up tubular element 4 from unrolling until it is detached, and

the restraining means such as a detachably attaching restraining element that connect adjoining surfaces or extensions of the adjoining surfaces, one on the inside of the tubular element 1, and the other on the outside of the same tubular element 1, preferably close to the distal exterior end of the tubular element 1, and

the wearer places the rolled-up 4 tubular element 1 near the body part that he desires to have covered by the same tubular element 1, and

the wearer places the desired body in the interior of, or immediately adjacent to the interior distal end of the tubular element 1,

the wearer then releases the restraining means such as when he detaches the detachably attaching restraining element(s), and

the wearer allows the rolled-up tubular element 4 to unroll onto that body part that he has placed in or immediately adjacent to the interior distal end of the tubular element 1.

4. The device of Claim 1, wherein heat can be applied by external means, such as by hair dryers or electric resistive heating of the springy elements or by the heat from the wearer's feet that are inserted into the inside distal end of the tubular element **1** to effect shape recovery.

5. The device of claim 1, wherein the restraining means are composed of detachable attachment(s) on the adjoining surfaces or extensions of the adjoining surfaces of the rolled tubular element **1**, preferably near the distal outside end of the tubular element, which when attached restrain the loaded rolled-up tubular element from unloading and unrolling, prior to when desired are comprised of complementary patches of hooks and loops, clasps, snaps, releasable adhesives or similar detachable attaching devices.

6. The device of claim 1, wherein one or more rings **10** are attached to or incorporated in the tubular element **1**, that impose a minimum diameter for the rolled-up tubular element, but allow the said ring to expand; but may not impose a minimum diameter for that part of the said tubular element that is not immediately adjacent to the said location of the ring(s) or is not rolled around it.

7. The device of claim 1, wherein the ring(s) **10** is comprised of beads and one or more connecting element(s), and

the connecting element may be a separate element or part of the tubular element, and

the connecting element(s) may be elastic or slide within the lumen of the said bead allowing the ring(s) so comprised to expand a predetermined amount, and

when the tubular element shrinks in a radial direction, at some point the beads butt against one another, limiting further shrinkage, and limiting the ring so comprised, and the tubular element to which it is attached, to having a predetermined minimum

diameter, but such that the ring(s) may not impose a minimum diameter for that part of the said tubular element that is not immediately adjacent to the said location of the ring(s), or is not rolled around it.

8. The device of claim 1, wherein one or more rings **10** are attached to or incorporated in the tubular element **1**, is comprised of an annular spring that impose a minimum diameter for the rolled-up tubular element, but allow the said ring to expand but may not impose a minimum diameter for that part of the said tubular element that is not immediately adjacent to the said location of the ring(s) or is not rolled around it.

9. The device of claim 1, wherein the tubular element is an article of clothing or body covering including: a sock, foot and or leg covering, a condom, and a sleeve and or cuff of gloves.

10. The device of claim 1, wherein the tubular elements **1** have an open distal end, and the tubular elements forms the legs of pants, and

the tubular elements are connected to the rest of the pants at the edge of the distal ends.

11. The device of claim 1, wherein the springy element is comprised of a fully enclosed straight or curved tube, or rib, and

the tube or rib is filled with a gas, such as air, and

the gas or air can be at ambient air pressure or at some other pressure including a higher preloaded pressure, and

the tube or rib is attached to or is incorporated in the tubular element **1**.

12. The device of claim 1, wherein the number, shape and location of the springy elements are located in or on the tubular element, such that when they spring back, they either roll-up or unroll the tubular element, depending upon the design of the system.

13. The device of claim 1, wherein a skid patch is attached to or incorporated into the inside surface of the rolled-up tubular element to provide a means for detaching the detachable attachment that constrains the loaded rolled-up tubular element 1 from unrolling.

14. The device of claim 1, wherein a hook or loop is attached to a part of the tubular element 1, 1a to assist in putting it on or taking it off.

15. The device of Claim 2, wherein heat can be applied by external means, such as by warm water baths, hair dryers or electric resistive heating of the springy elements, which may be applied by a battery 2b and controller 2d and conductors 2c attached to the tubular element 1 or by the heat from the wearer's feet that are inserted into the inside distal end of the tubular element.

16. The device of claim 2, wherein detachable attachments on the adjoining surfaces or extensions of the adjoining surfaces of the rolled tubular element, preferably near the distal outside end of the tubular element, which when attached restrain the loaded rolled-up tubular element from unloading and unrolling, prior to when desired are comprised of complementary patches of hooks and loops, clasps, snaps, releasable adhesives or similar detachable attaching devices.

17. The device of claim 2, wherein one or more rings 10 are attached to or incorporated in the tubular element 1, that impose a minimum diameter for the rolled-up tubular element, but allow the said ring to expand but may not impose a minimum diameter for that part of the said tubular element that is not immediately adjacent to the said location of the ring(s) or is not rolled around it.

18. The device of claim 2, wherein the ring(s) 10 is comprised of beads and one or more connecting element(s), and

the connecting element may be a separate element or part of the tubular element, and

the connecting element(s) may be elastic or slide within the lumen of the said bead allowing the ring(s) so comprised to expand a predetermined amount, and

when the tubular element shrinks in a radial direction, at some point the beads butt against one another, limiting further shrinkage, and limiting the ring(s) so comprised, and the tubular element to which it is attached, to having a predetermined minimum diameter, but the ring(s) may not impose a minimum diameter for that part of the said tubular element that is not immediately adjacent to the said location of the ring(s) or is not rolled around it.

19. The device of claim 2, wherein one or more rings 10 are attached to or incorporated in the tubular element 1, is comprised of a spring that impose a minimum diameter for the rolled-up tubular element, but allow the said ring to expand, but may not impose a minimum diameter for that part of the said tubular element that is not immediately adjacent to the said location of the ring(s) or is not rolled around it.

20. the device of claim 2, wherein the tubular element is a sock, condom, glove, foot or leg covering or pants.